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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/815,274	03/23/2001	Uwe Kruger	15811-002001	4574

26171 7590 06/25/2004

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WASHINGTON, DC 20005-3500

EXAMINER

SHARON, AYAL I

ART UNIT	PAPER NUMBER
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2123

DATE MAILED: 06/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/815,274	KRUGER ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Ayal I Sharon	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on 23 March 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/23/2001</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Introduction*

1. Claims 1-6 of U.S. Application 09/815,274 filed on 3/23/2001 are presented for examination. The application claims the foreign priority date of U.K. Patent Application 7063.1, filed on 3/23/2000. A preliminary amendment was filed on 3/23/2001, in which Claims 3 and 4 were amended and claims 5 and 6 were added.

### *Information Disclosure Statement*

2. Examiner located a reference, not cited by the Applicants, that appears to be relevant to the present application. However, the Examiner is unable to obtain a copy of the reference itself. The reference is:

**Kruger U., Desforges M.J., Lennox B., Sandoz D.J.**  
"On the Application of Non-Linear Partial Least Squares to Industrial Process Control" (1999)  
*DYMAC Conference, Manchester 1-3. September 1999*

The reference is co-authored by Messrs. Kruger and Sandoz, who are co-inventors in the current application. Applicants are requested to provide a copy of the reference in any response to this action.

3. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1)

states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

### ***Drawings***

4. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed. Figures 3,4,6,8, and 9 have faded lines in the upper row of graphs.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 3 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims all recite the following limitation (emphasis added): "... [a] monitor which has been designed/configured by the method of claim 1 **and which is so arranged** as to identify abnormal process behavior by analyzing the residuals of the response variables." It is unclear from the vague claim language what constitutes the claimed "arrangement".

7. Claims 4 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims all recite the following limitation (emphasis added): "identifying abnormal process behavior, at least in part, by analyzing the residuals of the response variables." It is unclear from the vague claim language what constitutes the claimed "analysis".

***Claim Rejections - 35 USC § 101***

8. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. Claims 1-6 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The mathematical algorithm recited in the claims is not limited to the technological arts. For example, the step in Claim 1 of "constructing from reference data ...", can also be broadly interpreted as being done by hand.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. The prior art used for these rejections is as follows:

12. Wold et al., U.S. Patent 5,949,678. (Henceforth referred to as "**Wold**").

13. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.

**14. Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Wold.**

15. In regards to Claim 1, Wold teaches the following limitations:

1. A method of designing/configuring a multivariate statistical process monitor by partial least squares approach comprises constructing from reference data of the process predictor and response matrices,  
(Wold, especially: col.9, lines 15 to 52; and col.13, line 12 to col.14, line 27)

In col.9, lines 17-20, "X" is defined as "a matrix with process variables (entries to predict Y)", which corresponds to the claimed "process predictor", and "Y" is defined as "a matrix with 'result' variables", which corresponds to the claimed "response matrices".

the predictor matrix being comprised of signals the manipulated and measured disturbance or cause variables of the process (predictor variables),

In col.9, lines 17-20, "X" is defined as "a matrix with process variables (entries to predict Y)". Examiner finds that "entries to predict Y" correspond to the claimed "predictor variables".

and the response matrix being comprised of the controlled or effect variables of the process (response variables),

In col.9, lines 17-20, "Y" is defined as "a matrix with 'result' variables", which corresponds to the claimed "response matrices". Examiner finds that "'result' variables" correspond to the claimed "response variables".

decomposing the predictor and response matrices into rank one component matrices,  
(Wold, especially: col.10, lines 26-40)

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In col.10, lines 26-28, Wold teaches that: "The principal component analysis, PCA, is usually based on an analysis of an (NxK) data matrix, Y, which starts with a matrix, centered and scaled into uniform column variance. PCA models this normalized matrix as a product of an (NxA) score matrix T, and an (AxK) loading matrix, P', as well as an (NxK) residual matrix, E."

each of said component matrices being comprised of a vector product in which one vector (the score vector) describes the variation  
(Wold, especially: col.9, lines 15 to 52; col.10, lines 26-40)

In col.9, line 44, "T" is defined as "score matrix of X, dimension (NxA)". Examiner finds that vectors which make up the score matrix correspond to the claimed "score vectors".

and the other (the loading vector) the contribution of the score vector to the predictor or response matrix,  
(Wold, especially: col.9, lines 15 to 52; col.10, lines 26-40)

In col.9, line 40, "P" is defined as "loading matrix, dimension (KxA)". Examiner finds that vectors which make up the loading matrix correspond to the claimed "loading vectors".

decomposition being performed by the creation of a parametric regression matrix based upon iterations of the decomposition of the predictor and response matrices,  
(Wold, especially: col.13, lines 54-58; and col.13, line 58 to col.14, line 28)

See Steps 7-11 of the cited section. Step 10 specifically recites "... iterating the algorithm to convergence.

characterised by the creation of a first generalised score vector which describes any significant variation of the process including variations of the predictor and response variables,  
(Wold, especially: col.13, lines 54-58; col.13, line 58 to col.14, line 28)

See  $t_{A, T+1}$  in Step 7 of the cited section.

and a second generalised score vector which represents the prediction error of the partial least squares model and residuals of the predictor matrix.  
(Wold, especially: col.13, lines 54-58; col.13, line 58 to col.14, line 28)

See  $t_{A, T+1}$  in Step 8 of the cited section.

16. In regards to Claim 2, Wold teaches the following limitations:

2. A method of designing/configuring a multivariate process monitor as claimed in claim 1 in which the generalised scores are calculated by



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constructing an augmented matrix, denoted here by  $Z$  and of the form  $Z = [Y : X]$ .

(Wold, especially: col.9, lines 24 to 52; col.10, lines 26-40)

See  $E_A$ ,  $F_A$  in col.9, lines 49 to 51 of the cited section.

17. All other dependent claims inherit the defects of claims 1-2.

### ***Correspondence Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (703) 306-0297. The examiner can normally be reached on Monday through Thursday, and the first Friday of a biweek, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska can be reached on (703) 305-9704. Any response to this office action should be mailed to:

Director of Patents and Trademarks  
Washington, DC 20231

Hand-delivered responses should be brought to the following office:

4<sup>th</sup> floor receptionist's office  
Crystal Park 2  
2121 Crystal Drive  
Arlington, VA 22202

The fax phone number is: (703) 872-9306

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist, whose telephone number is: (703) 305-3900.

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Ayal I. Sharon

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June 23, 2004



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